## IN THE CLAIMS:

- 1-10. Cancel
- 11. (Currently Amended) A method of exposing a resist on a substrate comprising the steps of:
  - a) providing the substrate with a film of resist;
  - b) placing the substrate on a stage; and
  - c) sensing the position of the substrate with a displacement sensor, wherein said displacement sensor comprises a differential variable reluctance transducer (DVRT); and
  - d) providing a source of radiation, and exposing said resist with said radiation.
- 12. (Previously added) The method as recited in claim 11, wherein the substrate comprises a wafer.
- 13. (Previously added) The method as recited in claim 12, wherein said wafer comprises a semiconductor.
- 14. (Cancel)
- 15. (Currently amended) The method as recited in claim 14 11, wherein said radiation has a wavelength to provide a structure having a dimension less than 100nm.

1520-006 (1426)

Page 4 of 19

09/876,443

- 16. (Currently amended) The method as recited in claim 15, wherein said radiation comprises x-ray radiation.
- 17. (Currently amended) The method as recited in claim 16, further comprising the step of collimating wherein said x-ray radiation is collimated.
- 18. (Currently amended) The method as recited in claim 16, further comprising the step of concentrating wherein said x-ray radiation is concentrated.
- 19. (Previously added) The method as recited in claim 14, further comprising the step of providing a mask for defining exposure of said resist.
- 20. (Previously added) The method as recited in claim 19, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of moving said stage to adjust said gap.
- 21. (Previously added) The method as recited in claim 19, further comprising the step of using output of said displacement sensor to control said exposing step.
- 22. (Previously Amended) The method as recited in claim 21, wherein said mask is positioned with respect to said substrate, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that position of said mask with respect to said substrate is optimum.
- 23. (Previously added) The method as recited in claim 22, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that said gap is optimum.

1520-006 (1426)

- 24. (Previously Amended) The method as recited in claim 19, further comprising the step of using said displacement sensor output to control mask to wafer misalignment.
- 25. (Previously Amended) The method as recited in claim 11, further comprising the step of using said displacement sensor output to control substrate x, y, z, rotation, and magnification.
- 26. (Canceled)
- 27. (Previously added) A system for exposing a substrate comprising a stepper and an X ray source, vibration insulation there between.

28 to 36 (Canceled)

- 37. (Currently amended) A method of exposing a resist on a substrate comprising the steps of:
  - a) providing the substrate with a film of resist;
  - b) placing the substrate on a stage;
  - c) providing x-ray radiation from a point source;
  - d) using an inline collimator or concentrator to collimate or concentrate collimating or concentrating said x-ray radiation;
  - e) providing a mask for defining exposure of said resist;
  - f) illuminating said mask with said x-ray radiation after said collimating or concentrating step (d); and
  - g) exposing said resist with x-ray radiation passing through said mask.
- 38. (Previously added) The method as recited in claim 37, wherein said x-ray radiation has a wavelength to provide a structure having a dimension less than 100nm.
- 39. (Canceled)
- 40. (Previously added) The method as recited in claim 37, wherein the substrate comprises a wafer.

1520-006 (1426)

Page 7 of 19

09/876,443

- 41. (Previously added) The method as recited in claim 40, wherein said wafer comprises a semiconductor.
- 42. (Previously added) The method as recited in claim 37, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of moving said stage to adjust said gap.
- 43. (Previously added) The method as recited in claim 37, further comprising the step of sensing the position of the substrate with a displacement sensor.

- 44. (Currently amended) A method of exposing a resist on a substrate comprising the steps of:
  - a) providing the substrate with a film of resist;
  - b) placing the substrate on a stage;
  - c) providing x-ray radiation from a point source;
  - d) collimating or concentrating said x-ray radiation;
  - e) providing a mask for defining exposure of said resist;
  - f) illuminating said mask with said x-ray radiation after said collimating or concentrating step (d);
  - g) exposing said resist with x-ray radiation passing through said mask; and
  - h) sensing position of the substrate with a displacement sensor wherein said displacement sensor comprises a differential variable reluctance transducer (DVRT).
- 45. (Previously amended) The method as recited in claim 43, further comprising the step of using output of said displacement sensor to control said exposing step.

- 46. (Previously amended) The method as recited in claim 45, wherein said mask is positioned with respect to said substrate, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that position of said mask with respect to said substrate is optimum.
- 47. (Previously amended) The method as recited in claim 45, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that said gap is optimum.
- 48. (Previously amended) The method as recited in claim 43, further comprising the step of using displacement sensor output to control mask to wafer misalignment.
- 49. (Previously amended) The method as recited in claim 43, further comprising the step of using displacement sensor output to control substrate x, y, z, rotation, and magnification.
- 50. (Currently amended) The method as recited in claim 37, wherein said x-ray radiation passes through a beam transport chamber having helium or other low attenuation gas or helium and another low attenuation gas at atmospheric pressure or at lower pressure.
- 51. (Previously added) The method as recited in claim 43, wherein said displacement sensor comprises a differential variable reluctance transducer (DVRT).
- 52. (Previously added) The method as recited in claim 44, further comprising the step of using output of said DVRT to control said exposing step.

- 53. (Currently amended) The method as recited in claim 52, wherein said mask is positioned with respect to said substrate, said method further comprising the step of exposing said resist at a time when said output of said DVRT output indicates that position of said mask with respect to said substrate is optimum.
- 54. (Currently amended) The method as recited in claim 52, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of exposing said resist at a time when said output of said DVRT output indicates that said gap is optimum.
- 55. (Currently amended) The method as recited in claim 44, further comprising the step of using output of said DVRT output to control mask to wafer misalignment.
- 56. (Currently amended) The method as recited in claim 44, further comprising the step of using output of said DVRT output to control substrate x, y, z, rotation, and magnification.
- 57. (New) The method as recited in claim 44, further comprising the step of using output of said DVRT to provide positional feedback for six degrees of freedom alignment of the substrate.
- (New) The method as recited in claim 57, further comprising the step of 58. controlling all six degrees of freedom of the substrate.
- 59. (New) The method as recited in claim 51, further comprising the step of using output of said DVRT to control said exposing step.

- 60. (New) The method as recited in claim 59, wherein said mask is positioned with respect to said substrate, said method further comprising the step of exposing said resist at a time when said output of said DVRT indicates that position of said mask with respect to said substrate is optimum.
- 61. (New) The method as recited in claim 59, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of exposing said resist at a time when said output of said DVRT indicates that said gap is optimum.
- 62. (New) The method as recited in claim 51, further comprising the step of using output of said DVRT to control mask to wafer misalignment.
- 63. (New) The method as recited in claim 51, further comprising the step of using output of said DVRT to control substrate x, y, z, rotation, and magnification.

- 64. (New) A method of exposing a resist on a substrate comprising the steps of:
  - a) providing the substrate with a film of resist;
  - b) placing the substrate on a stage;
  - c) providing x-ray radiation from a point source;
  - d) using an inline concentrator to concentrate said x-ray radiation;
  - e) providing a mask for defining exposure of said resist;
  - f) illuminating said mask with said x-ray radiation after said concentrating step (d); and
  - g) exposing said resist with x-ray radiation passing through said mask.

## 65. (New) A method of exposing a resist on a substrate comprising the steps of:

- a) providing the substrate with a film of resist;
- b) placing the substrate on a stage;
- c) providing x-ray radiation from a point source;
- d) concentrating said x-ray radiation;
- e) providing a mask for defining exposure of said resist;
- f) illuminating said mask with said x-ray radiation after said concentrating step (d);
- g) exposing said resist with x-ray radiation passing through said mask; and
- h) sensing position of the substrate with a displacement sensor wherein said displacement sensor comprises a differential variable reluctance transducer (DVRT).